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ABSTRACT

This paper describes the Developmental Knowledge and Management Practices Scale. It is designed for assessing the primary care physicians' knowledge of development and their management practices when faced with children exhibiting evidence of handicap. The scale may be useful for assessing the inservice training needs of primary care physicians with respect to child development and case management, and for evaluating preservice and inservice programs designed to meet those needs. The content areas of development assessed by this scale include affective, temperament, social, cognitive, language, sensory, gross motor and fine motor skills. Sample items and an answer key are also included. The primary care physician is the professional with one of the best opportunities for early detection of developmental difficulty in children. Currently available evidence suggests, however, that these physicians are not referring developmentally disabled infants and young children for services as rapidly as possible. Several explanations are offered for this delay in referral. (DWH)

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Assessing Physicians' Knowledge of  
Normal and Atypical Development

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Abstract

The primary care physician is the professional with one of the best opportunities for early detection of developmental difficulty in children.

Currently available evidence suggests, however, that primary care physicians are not referring developmentally disabled infants and young children for services as rapidly as possible. One possible explanation for delayed referral is a lack of knowledge, on the part of the primary care physician, of normal child development. This paper describes the development of a scale for assessing physicians' knowledge of development and their management practices when faced with children exhibiting evidence of handicap. The scale may be useful for assessing the inservice training needs of primary care physicians vis-a-vis child development and case management, and for evaluating preservice and inservice programs designed to meet those needs.

## Assessing Physicians' Knowledge of Normal and Atypical Development

The professional with one of the best opportunities for early discovery of developmental anomaly in children is the primary care physician (Jacobs & Walker, 1978; Masland, 1969; Pearson, 1968, 1976). This professional, through assessment of developmental status and parent-child interaction in the routine pediatric examination, can gain early insight into whether or not a child is developing normally. Early discovery of a developmental problem by the physician can lead to the implementation of special programs for parents and child that may serve to minimize the effects of developmental disability.

At present, however, physicians are not referring infants and young children exhibiting evidence of developmental disorder as early in the child's life as possible (Ruben, 1978; Shah, Chandler, & Dale, 1978). Tardiness in referral may result in the delayed provision of needed intervention services, the persistence of unrealistic expectations by parents for the child's development, and the emergence of difficulties secondary to the primary developmental problem.

A number of explanations have been suggested for delayed referral by physicians. One such cause is a tendency on the part of the physician to postpone diagnosis in the hope that time will either allow the child to "catch-up," or, alternatively, show the child to possess a clearly identifiable diagnostic entity (Tjossem, 1976). Also suggested as a cause for tardy referral is a lack of knowledge of historical high risk signs (Pearson, 1968) and a lack of knowledge of normal child development or the measures used in its assessment (Lewis, 1979). Finally, delayed referral may be

related to a lack of knowledge of available community evaluation and intervention services (Masland, 1969; Tjossem, 1976).

This paper describes development of an experimental scale for assessing (a) physicians' knowledge of normal child development and (b) their management actions with regard to children exhibiting behaviors indicative of developmental anomaly. The scale may be useful for specifying training needs of physicians vis-a-vis their ability to successfully identify and manage developmentally atypical infants and young children and for evaluating the success of educational programs designed to increase physicians' assessment and management competency. The instrument is targeted for use with medical students, residents in pediatrics and family practice, practicing pediatricians, and family and general practitioners. Use of the scale with physicians other than the pediatrician is anticipated because both family and general practitioners are involved in the provision of primary care to substantial portions of the nation's children (Rosenbloom & Ongley, 1974; Task Force on Pediatric Education, 1978).

#### Method

For the Developmental Knowledge and Management Practices Scale, an item format was chosen that displays a particular behavior or set of behaviors representative of the actions of a hypothetical child of a given age. The physician is asked to read the description of behavior and then characterize the behavior as developmentally advanced, normal, suspect, or delayed for a child of that age. Next, the physician is asked to choose a course of action with regard to the management of the child. These choices range from

a routine followup option, through additional tests necessary and continued observation, to referral to a specialist. If the physician chooses the referral to a specialist option, indication of the particular specialist to whom referral is being made is requested. This item format was chosen over more conventional formats because of its ability to provide, within the context of a single item, information on both knowledge and the ability to apply that knowledge. A sample item is presented in Figure 1.

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Insert Figure 1 about here

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The scale was designed to cover eight areas of development across four levels of subject status. The areas of development included the affective, temperament, social, cognitive, language, sensory, gross motor, and fine motor domains. Levels of subject status were advanced, normal, suspect, and delayed or pathological. These status levels are defined as follows:

Advanced--any behavior or set of behaviors normally expected to appear at more than 1.50 times the chronological age of the described child.

The behavior of a 6-month-old that is not normally seen until the ninth month would be considered to be advanced by this criterion.

Normal--any behavior or set of behaviors normally expected to appear at .75 to 1.50 times the chronological age of the described child.

Suspect--any behavior or set of behaviors normally expected to appear at .50 to .75 times the chronological age of the described child. Also included in this category is any behavior or set of behaviors that are suspect for pathology.

Delayed or Pathological--any behavior or set of behaviors normally expected to appear at less than .50 times the chronological age of the described child. Also included in this category are behaviors that are pathological.

The sources for the behaviors that compose the items and the ages at which the behaviors normally appear were the Denver Developmental Screening Test (Frankenburg & Dodds, 1969), the Gesell Developmental Schedules (Gesell & Amatruda, 1947), The First Year of Life (1971) series, and Child Development and Personality (Mussen, Conger, & Kagan, 1974).

Insert Table 1 about here

Table 1 shows the number of items written for each area-by-status cell. After initial formulation, these items were subjected to editing and review by experts in pediatric medicine and developmental psychology. The resulting items, along with answer key, content classification, and examinee instructions, are presented in the appendix to this paper.

#### Implications

The experimental scale described in this paper may be useful for determining child-care physicians' knowledge of development and ability to appropriately manage young children exhibiting behaviors of a deviant or suspect nature. As such, the scale may be employed as a research tool for evaluating the success of medical education programs and for determining specific training needs of physicians engaged in the provision of primary care to children.

It is suggested that future research with this experimental version of the Developmental Knowledge and Management Practices Scale focus on construction and validation of a final version of the instrument. This research should attempt to specify what subset of the 94 items composing the experimental scale makes for the most valid and reliable evaluation instrument.

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Figure 1

Sample Item for Developmental Knowledge and Management Practices Scale: Full Format

A six month male infant is generally irritable and does not quiet himself with sucking, or to mother's holding, voice or face.

A. I would characterize this child's behavior as . . .

- 1. Advanced (i.e., developmental level greater than 9 months)
- 2. Normal (i.e., developmental level between 4.5 and 9 months)
- 3. Suspect: Possible delay or pathology (e.g., developmental level between 3 and 4.5 months)
- 4. Delayed or Pathological (e.g., developmental level less than 3 months)

B. Based on the information presented I feel that . . .

- 1. only routine follow-up is necessary
- 2. additional tests are needed (please specify):
- 3. continued observation is required; problem will probably resolve itself
- 4. continued observation is required before problem can be diagnosed
- 5. immediate referral for further evaluation is warranted to . . .
  - 1. otolaryngologist
  - 2. pediatric neurologist
  - 3. ophthalmologist
  - 4. child psychiatrist
  - 5. pediatric or developmental psychologist
  - 6. clinical child psychologist
  - 7. special educator
  - 8. speech and language pathologist
  - 9. audiologist
  - 10. physical therapist
  - 11. occupational therapist
  - 12. social worker
  - 13. infant stimulation program
  - 14. other (please specify):

Table 1.

Numbers of Items for Each Area of Development and Status Level

<u>Area of Development</u>	<u>Status Level</u>				<u>Row Totals</u>
	<u>Advanced</u>	<u>Normal</u>	<u>Suspect</u>	<u>Delayed</u>	
Affective	2	3	2	3	10
Temperament	2	3	2	3	10
Social	3	3	3	3	12
Cognitive	3	3	3	3	12
Language	3	3	3	3	12
Sensory	1	3	3	3	10
Gross Motor	3	4	3	5	15
Fine Motor	3	3	3	4	13
Column Totals	20	25	22	27	94

Appendix

Directions for Developmental Knowledge and Management Practices Scales

On the following pages you will find a series of short behavioral descriptions of children. All descriptions are characteristic of the children's present behavior. Each child described comes from an intact, middle class family that has no history of unusual medical, psychological, or developmental disorder. In each case all factors surrounding pregnancy, labor, and delivery were normal. No significant medical events are found in the children's histories. Please read each behavioral description carefully and indicate in the space provided (1) whether you think the behavior described is advanced, normal, suspect, or delayed or pathological, and (2) your choice of a preferred course of action to be taken with regard to the child on the basis of the described behavior. Please answer all questions without reference to outside sources.

Pool of Item Displays for Developmental Knowledge and Management Practices Scale

1. An eight month old baby boy does not vary volume, pitch, or rate of his utterances, nor babble in response to a variety of female voices. When talked to, the baby smiles, squeals, and coos. The baby is able to crawl, stand leaning against something, and sit steadily for several minutes.
2. A six month old male infant is generally irritable and does not quiet himself with sucking, or to mother's holding, voice or face.
3. A six month old female infant feeds herself whole meals and helps dress herself.
4. A six month old baby girl does not combine two different words in speech, nor point to a named body part. The baby uses "mama" and "dada" properly along with two additional words. The baby is able to stand with substantial support and sit with slight support.
5. An eight month old baby boy will search for a hidden toy if he is looking as it is hidden, and will pull on a string to get an attached toy.
6. A six month old baby girl does not seem to show interest in sounds nor respond to voices. Her sound production consists primarily of crying and small throaty sounds. The baby is able to turn her head freely, creep, and sit briefly without support.
7. An eight month old male can lift his head when in supine, sit erect for brief periods, and stand momentarily with his hands held by an adult. The child cannot cruise along furniture, or stoop and recover balance.
8. An eight month old female infant stops crying when talked to and sleeps, wakes, and naps at different times each day.
9. A ten month old male can walk up steps, throw a ball overhand, and walk backwards. The child cannot kick a ball forward nor jump in place.
10. A ten month old female infant reacts noticeably to separation from mother and shows fear of strange persons and places.
11. A ten month old female can roll in supine part way to her side, sit supported with some head sag, and briefly support herself on forearms in prone. The child cannot turn her head in all directions when lying or seated, or keep her body in the same plane from shoulders to feet when pulled to stand.
12. A ten month old baby boy can build a tower of four cubes and imitate the sounds of a car, motorcycle, and a variety of animals in play situations.
13. A six month old baby boy will pull a dangling object toward him and carry it to his mouth, and remain alert and responsive for about 15 minutes at a time before becoming fussy.
14. A six month old male can support himself briefly in prone on forearms, sit with support with minimal head bobbing, and make crawling movements (but not crawl) when placed on his stomach. The child cannot roll from prone to supine, or stand with support.

15. A ten month old baby boy does not say any words other than "mama" or "dada" nor have well developed control of intonation patterns. His language comprehension consists primarily of understanding and obeying some words and simple commands. The baby is able to stand with little support, side-step along furniture, and climb up and down from chairs.
16. A six month old baby boy laterally follows an object held three feet in front of his face with eyes and head for about ten seconds, and remains attentive for up to three quarters of an hour at a time.
17. An eight month old baby girl stares at an attractive, large object placed several feet in front of her, but is not able to laterally track the object at that distance across the midline with eyes and head.
18. An eight month old infant vocalizes in apparent enjoyment while playing with a toy. When the baby is picked up by mother, and play interrupted, the infant becomes visibly upset. The baby often expresses moods in this way (i.e., through vocalizing). The baby most often shows enjoyment and protest, and has not shown expressions of fear, disgust or anger.
19. A ten month old baby girl changes facial expression according to the tone of voice in which she is spoken to. She does not yet appear to recognize any of the words commonly used by her parents during their interaction with her.
20. An eight month old baby makes eye to eye contact with mother, and smiles back at a face or voice though the smile is not immediate. The baby does not yet appear to visually recognize mother.
21. An eight month old baby reacts sharply to separation from mother and shows definite preferences for certain people over others. The baby does not yet use a spoon well when eating.
22. A ten month old infant shows a positive response to a toy that mother places on the floor. When the toy rolls under a desk and baby lightly bumps her head trying to retrieve it, the baby appears to whimper in response to the pain. At home, the baby often responds positively to comfort and negatively to pain. The baby does not show more finely differentiated moods such as excitement, delight, indecision, or protest.
23. A six month old baby prefers to play with people (as opposed to objects), and smiles at, and reaches out to pat unfamiliar children. The baby does not appear to fear strangers.
24. An eight month old male generally keeps hands fisted or slightly open, and stares at objects but does not reach for them. The baby is also not yet able to hold objects or swipe at them.
25. A six month old baby girl brightens and shows other signs of recognition when words often spoken to her by her parents are repeated to her. The baby does not yet appear able to understand spoken commands.
26. A six month old baby girl can turn her head in the direction of a voice, or in the direction of a noise made by a toy held out of her sight. She does not yet appear to recognize her name.

27. A ten month old female can hold two objects, one in each hand simultaneously, and can grasp a block with fingers. The baby is not yet able to pick up string, or use a pincer grasp.
28. A six month old infant looks happy while playing with a toy. When the toy rolls under a desk, outside of the baby's reach, a sad look comes across the baby's face. The baby often expresses a variety of moods facially. The baby most often shows happiness, discomfort, anger, and hurt through facial expression. The baby does not appear to recognize these different emotions in others.
29. A ten month old infant looks happy while playing with a toy. When the toy rolls under a desk, outside of the baby's reach, a sad look comes across the baby's face. The baby often expresses a variety of moods facially. The baby most often shows happiness, discomfort, anger, and hurt through facial expression. The baby does not appear to recognize these different emotions in others.
30. An eight month old female can spontaneously scribble with a large crayon, and undress herself. The baby is not yet able to build a tower of two wooden cubes, or spontaneously dump a raisin from a bottle.
31. A ten month old baby smiles to people's faces and voices, and vocalizes to make contact with others. While easily comforted, the baby does not appear to be more adequately comforted by mother than by other familiar or strange adults.
32. A six month old female is able to hold a bottle, turn and manipulate objects, and reach for toys with one arm at a time. She is not yet able to grasp a block with her thumb, first and second fingers, nor pick up a piece of string.
33. A ten month old female is able to build a tower of four cubes. She is not yet able to imitate the drawing of a vertical line.
34. A six month old female generally swipes at objects with a moderate degree of accuracy. The baby is not yet able to hold a small cube between her index and second fingers.
35. An eight month old female is able to hold her rattle for 3-4 minutes before letting it go. The baby is not yet able to successfully pick up a raisin or shoelace with a thumb-forefinger grasp.
36. A ten month old male generally picks up objects with a "mitten" grasp in which the palm and fingers appose the thumb. The baby is not yet able to hold a bottle.
37. A six month old baby girl appears to search expectantly for the contents of an empty box. The baby does not yet routinely place objects in nor remove them from boxes, however.
38. A ten month old baby boy is beginning to prefer the use of his right hand to his left. The baby does not yet use both hands at the same time for performing different tasks.
39. A six month old baby boy will visually follow a toy from the side to the center of his body but not across the midline.
40. An eight month old baby girl will remain alert up to an hour and a half at a time and show signs of being alert close to 30% of daylight hours.

41. An eight month old baby girl coos, squeals, and chuckles. The baby is able to sit alone steadily for several minutes and stand leaning against furniture.
42. A ten month old baby boy utters vowel sounds and consonant-like sounds, varies pitch, volume, and rate of his utterances, and understands his name. The baby is able to stand with little support and side step along furniture.
43. An eight month old baby babbles spontaneously with a variety of sounds and inflections, and sometimes imposes adult intonation on his babbling. The baby is able to crawl, stand leaning against a support, and sit alone steadily for several minutes.
44. A six month old male shows a moro reflex in response to sudden stimulation. In addition, the tonic neck reflex has not yet begun to disappear.
45. An eight month old female is able to hold her head steady and erect when pulled to sit, and is not yet able to sit unsupported.
46. A ten month old baby climbs up and down from chairs and stands with little support.
47. A six month old baby raises himself to stand by straightening his legs and arms and pushing up and off from his palms.
48. An eight month old says "ba" to refer to the family dog and correctly points to her nose when told to by mother.
49. A ten month old baby vocalizes when talked to and does not respond to or seem to enjoy mother's holding.
50. A six month old infant smiles immediately and spontaneously at people. The baby does not yet show interest in playthings.
51. An eight month old infant appears able to distinguish friendly from angry speech. The infant does not yet show preferences for one toy over another.
52. A ten month old baby is able to use a spoon accurately for eating. The baby does not yet help undress herself.
53. An eight month old awakens at a different time each morning.
54. A ten month old baby does not cooperate with dressing.
55. A six month old infant falls asleep at 6:30 every night and awakens at 7:00 each morning.
56. An eight month old sleeps well in new surroundings.
57. An eight month old baby shows a vague and impassive facial expression a great deal of the time. The baby does not yet express excitement or delight.
58. A ten month old baby expresses protest and resists an adult who tries to take a toy away. The baby does not yet play pat-a-cake with an adult.
59. A six month old baby has begun to show signs of a developing sense of humor. The baby does not yet seem to fear strangers.

60. An eight month old expresses many emotions and appears able to recognize them in others. The baby does not yet show clear signs of being able to distinguish himself from others.
61. A six month old infant can sit with slight support and roll from supine to prone. The baby does not yet mold in mother's arms, nor make eye contact with adults.
62. An eight month old baby will search behind a screen for an object if he is looking as it is hidden. The baby has not yet developed a voluntary grasp, with grasp still showing signs of being under reflex control.
63. A ten month old infant side-steps along furniture and climbs up and down from chairs. The baby does not yet turn toward the source of a novel sound.
64. A six month old baby smiles and vocalizes to mother's face while being held. The baby does not yet visually follow a moving object held four feet in front of her.
65. An eight month old baby shows fear of heights and evidence of attending to the movements and positions of her hands as they engage objects. The baby does not yet respond to mother's vocal commands.
66. A ten month old baby shows an occasional alternating rapid and slow lateral deflection of the eyes. The baby seems to tilt her head slightly when looking at people or objects.
67. A six month old baby shows no head sag when pulled to sit. The baby cannot yet sit without support, and evidences frequent drooling from the mouth.
68. A ten month old baby drags her legs after her when crawling.
69. A ten month old infant evidences tremors of the arms and hands, and rolling and banging of the head.
70. An eight month old baby frequently chokes when fed semi-solids and fails to chew food.
71. A ten month old baby is capable of showing a variety of moods such as happiness, sadness, discomfort, and anger. The baby does not yet react sharply to separation from mother.
72. A ten month old rejects new foods each time they are offered, moves bowels at a different time each day and cries when left alone.
73. An eight month old smiles at everyone, likes new foods, and falls asleep at about the same hour each evening.
74. A ten month old baby turns her head to sounds and reacts to changes in sound volume. The baby also reaches indiscriminately for near and far objects.
75. A six month old baby reaches persistently for attractive objects. The baby often inspects objects for extended periods.
76. An eight month old baby can hold her head up at a 45° angle for a few minutes' time while lying in prone. When pulled to stand and supported under her arms, the baby cannot yet maintain a standing position.

77. A ten month old locomotes by rocking, rolling, and twisting on her stomach. The baby does not yet creep or crawl.
78. A six month old baby does not yet attempt to pull herself to stand using supports such as furniture. When the baby is pulled to stand by an adult, she can maintain that position only with substantial support.
79. A ten month old baby is able to walk backwards and walk up steps. The baby cannot yet throw a ball overhand.
80. An eight month old infant shows interest in playing with toys and will resist an adult trying to take a toy away. The baby does not show interest in peek-a-boo games or in other types of cooperative play.
81. A ten month old baby shows affection to humans and to objects like toys. The baby reacts strongly to separation from mother.
82. A six month old shows interest in others' play and has preferences for some toys over others. The baby does not yet play pat-a-cake games.
83. A six month old baby shows interest in sounds and cries to express discomfort and hunger. The baby does not yet use vocalization in response to the smiles or speech of others. The baby has not yet begun to babble.
84. An eight month old baby smiles, squeals, and coos whenever she is talked to. The baby does not yet appear to react to differences in tone or inflection in the utterances spoken to her.
85. A ten month old infant obeys simple commands such as "Give it to me." The baby does not yet use words productively, other than "mama" or "papa."
86. A six month old listens with interest to particular words frequently used in her presence and appears to understand and obey simple commands. The baby does not yet use single word utterances successively.
87. A ten month old remains responsive, alert, and interested for periods of up to 10 or 15 minutes per day. The baby does not yet show signs of recognition when presented with familiar objects.
88. A six month old becomes bored after repeated instances of the same sound or visual image. The baby does not yet show eye hand regard during play.
89. An eight month old watches his hands closely in various positions as they engage and release objects. The baby does not yet imitate an adult's scribble.
90. A ten month old scribbles spontaneously and is able to build a tower of four cubes. The infant does not yet combine words in short sentences.
91. An eight month old has begun to swipe at objects but is as yet still inaccurate in these efforts. The baby cannot yet hold a bottle.
92. A ten month old infant is able to grab objects and swap them from hand to hand. The baby does not yet show complete thumb-forefinger apposition.
93. A six month old baby is able to hold two objects, one in each hand simultaneously. The baby is able to grasp a block with the thumb, first, and second fingers, but cannot yet use a pincer grasp.

94. An eight month old infant is able to point with an index finger, and shows preference for the use of one hand over the other. The baby does not yet scribble spontaneously.

**Answer Key and Content Classification of  
Developmental Knowledge Items**

<u>Item #</u>	<u>Answer</u>	<u>Content Area</u>
1	Suspect	Language
2	Delayed or Pathological	Temperament
3	Advanced	Temperament
4	Advanced	Language
5	Normal	Cognitive
6	Delayed or Path	Language
7	Normal	Gross Motor
8	Suspect	Temperament
9	Advanced	Gross Motor
10	Normal	Temperament
11	Delayed or Path	Gross Motor
12	Advanced	Cognitive
13	Suspect	Cognitive
14	Suspect	Gross Motor
15	Normal	Language
16	Delayed or Path	Cognitive
17	Delayed or Path	Sensory
18	Suspect	Affective
19	Suspect	Sensory
20	Delayed or Path	Social
21	Advanced	Social
22	Delayed or Path	Affective
23	Normal	Social
24	Delayed or Path	Fine motor
25	Advanced	Sensory
26	Normal	Sensory
27	Suspect	Fine Motor
28	Advanced	Affective
29	Normal	Affective
30	Advanced	Fine Motor
31	Suspect	Social
32	Normal	Fine Motor
33	Advanced	Fine Motor
34	Suspect	Fine Motor
35	Normal	Fine Motor
36	Delayed or Path	Fine Motor
37	Advanced	Cognitive
38	Normal	Cognitive
39	Delayed or Path	Cognitive
40	Suspect	Cognitive
41	Delayed or Path	Language
42	Suspect	Language
43	Normal	Language
44	Delayed or Path	Gross Motor
45	Suspect	Gross Motor
46	Normal	Gross Motor
47	Advanced	Gross Motor
48	Advanced	Language
49	Delayed or Path	Social
50	Suspect	Social
51	Normal	Social
52	Advanced	Social

<u>Item #</u>	<u>Answer</u>	<u>Content Area</u>
53	Delayed or Path	Temperament
54	Suspect	Temperament
55	Normal	Temperament
56	Advanced	Temperament
57	Delayed or Path	Affective
58	Suspect	Affective
59	Normal	Affective
60	Advanced	Affective
61	Delayed or Path	Social
62	Delayed or Path	Gross Motor
63	Delayed or Path	Sensory
64	Suspect	Sensory
65	Normal	Sensory
66	Delayed or Path	Gross Motor
67	Normal	Gross Motor
68	Delayed or Path	Affective
69	Delayed or Path	Fine Motor
70	Delayed or Path	Affective
71	Normal	Temperament
72	Delayed or Path	Temperament
73	Normal	Sensory
74	Suspect	Sensory
75	Normal	Gross Motor
76	Delayed or Path	Gross Motor
77	Suspect	Gross Motor
78	Normal	Gross Motor
79	Advanced	Gross Motor
80	Suspect	Social
81	Normal	Social
82	Advanced	Social
83	Delayed or Path	Language
84	Suspect	Language
85	Normal	Language
86	Advanced	Language
87	Delayed or Path	Cognitive
88	Suspect	Cognitive
89	Normal	Cognitive
90	Advanced	Cognitive
91	Delayed or Path	Fine Motor
92	Suspect	Fine Motor
93	Normal	Fine Motor
94	Advanced	Fine Motor